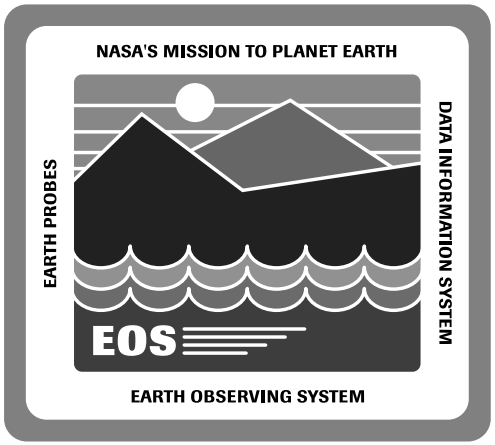


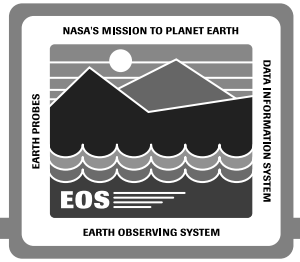
Road To TRMM Launch

Parag Ambardekar

pambarde@eos.hitc.com

ECS Release A SDPS/CSMS Critical Design Review
17 August 1995

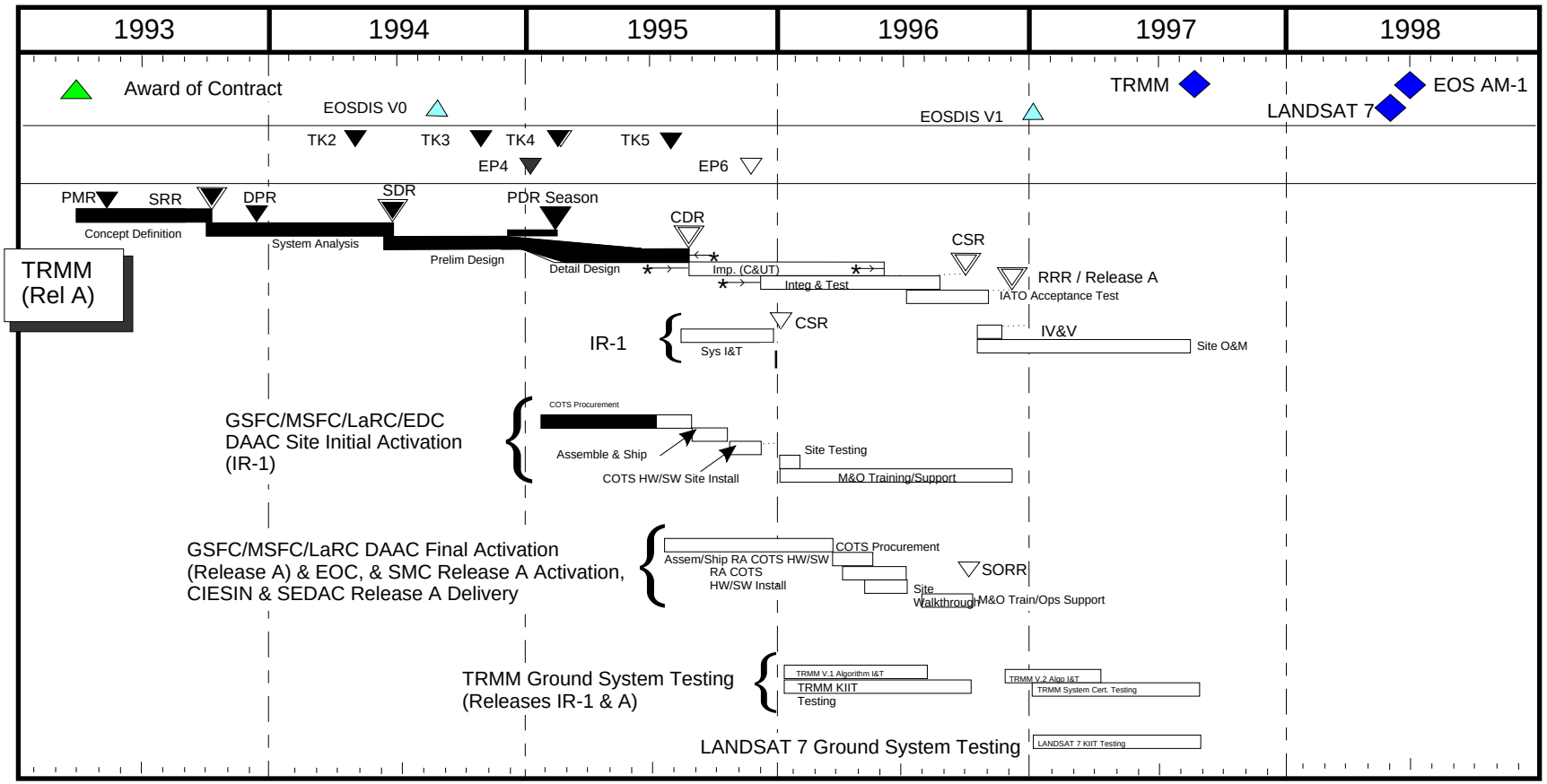
Scope and Outline



Release A CDR to TRMM Launch

- **Release A and Overall ECS schedule** ⟵
- **Ir1 Status**
- **Planning Considerations**
- **Custom Code Development**
- **Integration of COTS and Incremental Track Software**
- **Test Activities**
- **TRMM Operations Readiness**
- **Summary**

ECS Master Schedule



Implementation Schedule Presented at CDR (to be incorporated in 10/95 Rebaselining)

* Incorporates proposed changes to ECS Baseline
Activity (Baseline Early Start/Finish Dates)
Float
Control (Late Finish)
Contract (Late Finish)
Launch

Scope and Outline

Release A CDR to TRMM Launch

- **Release A and Overall ECS schedule**
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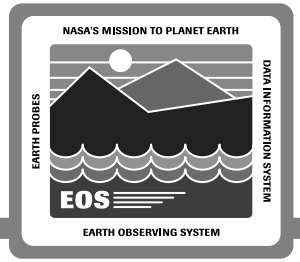
Ir1 Status



Dedicated Ir1 team formed in late March ‘95

Objectives, services, COTS selections, architecture, FAQ and schedule summarized in “Ir1 Mission Statement”

Key change since PDR was implementation of PDPS prototype based on selected Release A COTS scheduling package

Refined Ir1 requirements allocations based upon post-PDR ECS Release Plan update and PDR RIDs

Detailed software design inspections held April-June ‘95

Detailed Ir1 software designs coordinated with Release A developers in support of CDR (to promote maximum code reuse)

Ir1 COTS procurement largely completed (all orders placed)

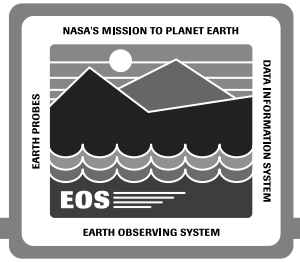
Now undergoing code and unit test (about 60% complete)

I&T conduct begins in September

Consent-to-Ship Review (CSR) December 28, 1995

Installation January 2, 1996

Ir1 to A Transition



Release A reuse of Ir1 equipment saves cost, but requires careful planning to minimize resource conflicts

Goals for the transition phase are to:

- **Minimize potential gap(s) in SSI&T service availability that may exist between Ir1 and A**
- **Ensure the availability of Ir1 interface test related equipment when needed for conducting TRMM Ground System I&T**
- **Ensure the availability of Ir1 equipment needed to install, configure, test, train, accept, IV&V and activate Release A**

ECS analysis of transition-relevant activities, schedules and equipment needs is now underway

A preliminary transition planning white paper will be made available around the end of September ‘95

Scope and Outline

Release A CDR to TRMM Launch

- **Release A and Overall ECS schedule**
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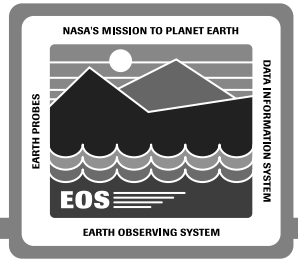
Release A Object Model

CDR Statistics

Subsystem/CI	*Num. of Classes*	*Num. of Attributes*	*Num. of Operations*
DDIST	30	48	72
STMGT	33	90	215
SDSRV	138	233	652
DDSRV	43	128	113
INGST	70	138	189
PLANG	73	134	227
PRONG	71	262	254
MSS	109	221	262
CSS	65	128	408
ADSRV	19	46	107
GTWAY	39	58	171
DESKT	8	17	23
Total	698	1503	2693

SLOC Estimates By CSCI

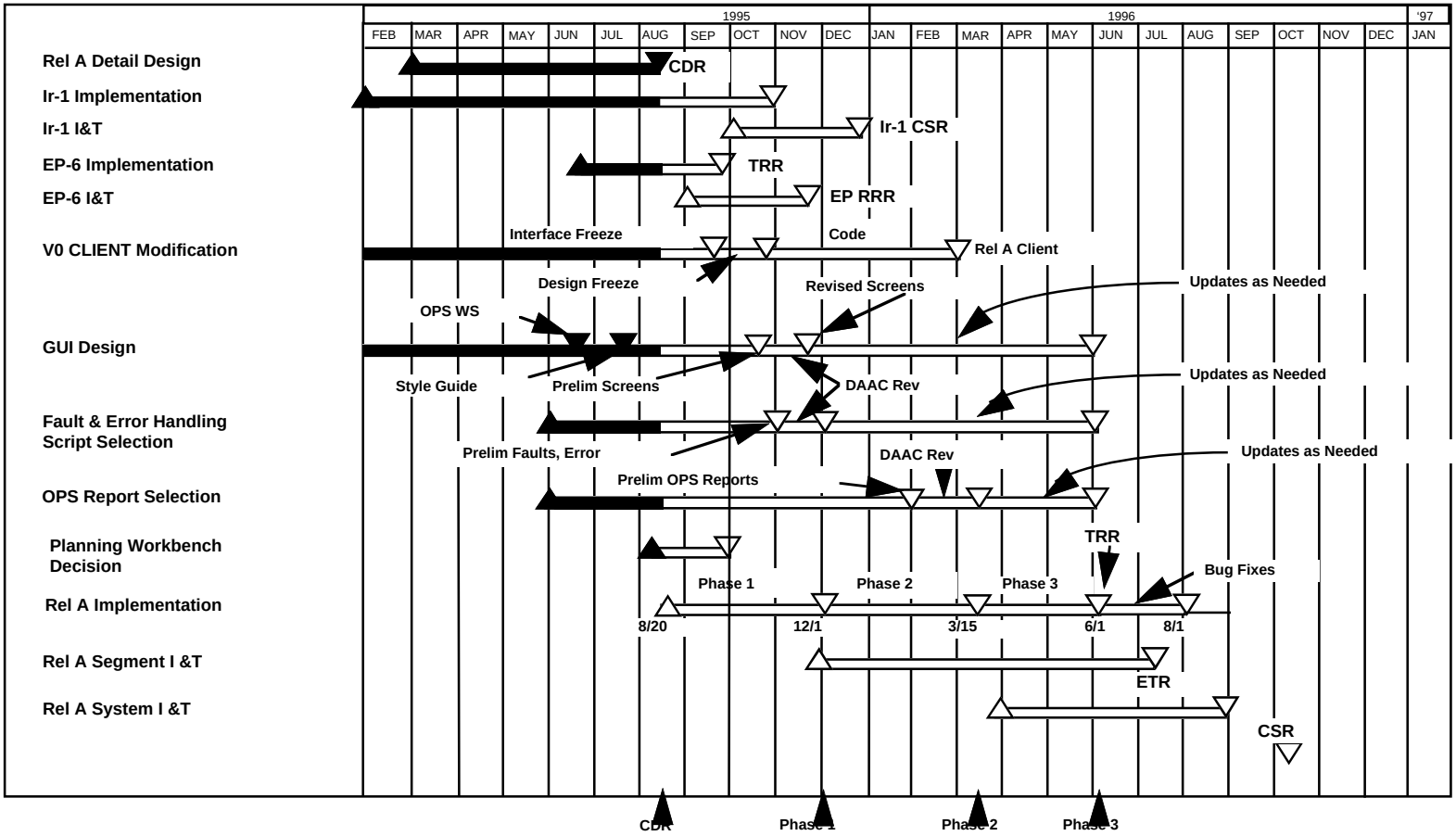


CI	PDR	CDR	Delta
CIDM			
Desktop (DESKT)	2,200	2,200	
Workbench (WKBCH)	6,000	6,000	
Advertising Service (ADSRV)	10,700	10,700	
Data Dictionary (DDICT)	3,350	0	-3,350
V0 Interoperability Gateway (GTWAY)	5,250	12,000	6,750
Data Server			
Science Data Server (SDSRV)	34,175	34,175	
Document Data Server (DDSRV)	4,000	4,000	
Storage Mgmt (STMGT)	11,400	11,400	
Data Distribution (DDIST)	6,500	6,500	
Ingest			
Ingest (INGST)	20,000	19,050	-950
PDPS			
Production Planning (PLANG)	18,000	18,000	
Processing (PRONG)	17,410	20,410	3,000
Science Data Pre-Processing (DPREP)	3,000	0	-3,000
Algorithm I&T (AITTL)	6,350	6,350	
CSS			
Distributed Computing Software CI (DCCI)	43,500	48,000	4,500
MSS			
Management Software CI (MCI)	17,500	18,500	1,000
Management Agents CI (MACI)	3,500	3,500	
Management Logistics CI (MLCI)	1,500	1,500	
Release A total	214,335	222,285	7,950

Note: DPREP CI SLOC merged with PRONG
DDIST moved to Rel B

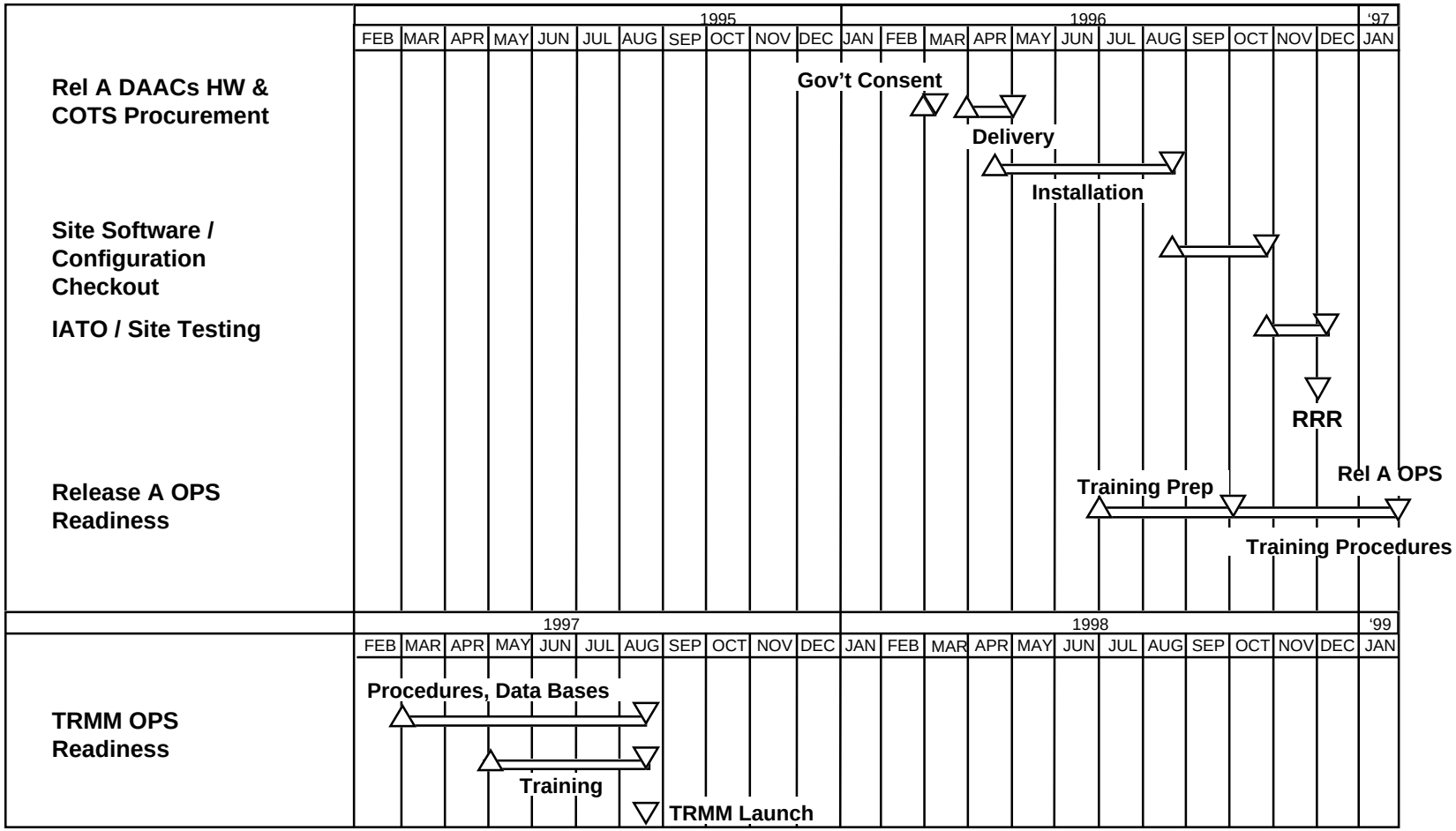
Proposed Implementation Schedule (1 of 2)

RELEASE A IMPLEMENTATION PLAN

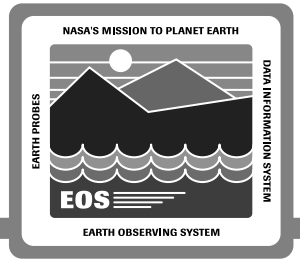


Proposed Implementation Schedule (2 of 2)

RELEASE A IMPLEMENTATION PLAN



Release A Challenge



Major Milestones

8/18/95 CDR

10/1/96 CSR

12/1/96 RRR

In 13 Months

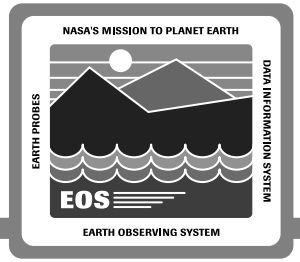
Code, unit test, and integrate 225,000 LOC

Integrate 18 COTS packages

Verify 2270 L4 requirements

Verify 691 L3 requirements

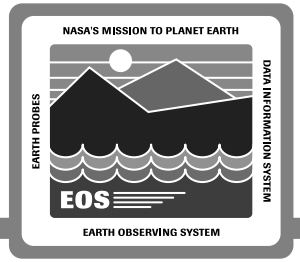
Technical Approach



Phased Implementation Approach

- **Divide and Conquer**
  - **divide implementation in three phases**
- **Build a little, test a little**
  - **avoid and minimize surprises**
- **Start integration and test early**
  - **provides more time for testing**
- **Conduct I&T in parallel with implementation**
  - **provides more time for implementation, reduces schedule risk**

Implementation Phase Objectives



Avoid a big bang approach

Consider inter-CI dependencies

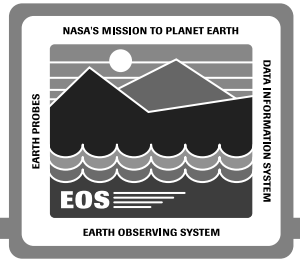
Implementation of critical functions early

Build early success, build some simple functions early

Smooth out staffing requirement

Provide functional threads for testing

Goals of Each Phase



First phase is conservative

- **CDR Wrap-up**
- **Emphasis on infrastructure**
- **Implementation phase 'warm-up'**

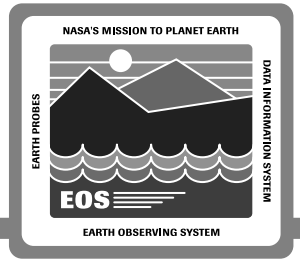
Second Phase delivers many functions

- **Higher productivity**
- **Implement most of the basic functionality**
- **Fix bugs from previous phase**

Third Phase completes functionality

- **Provide remaining functionality**
- **Build "Bells and Whistles", if any**
- **Fix bugs from previous two phases**

Scope and Outline



Release A CDR to TRMM Launch

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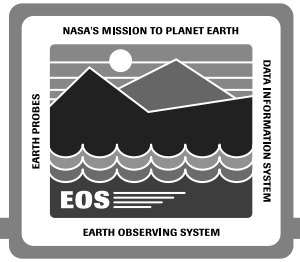
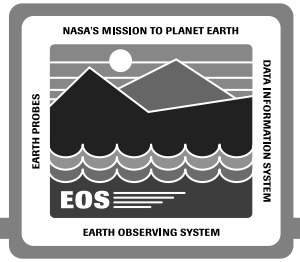
Release A Functionality Phase One



CSS	MSS	DSS	INS	CIDM	PDPS
Distributed Object Framework (including concurrent test and operations support) Synchronous Message Passing Threads and Time Services Event Logging of Application and Management Events Security Authorization Support to MSS to Manage Application Startup/Shutdown	Extensible Agent and MIB for Applications (partial) and Hosts User Account Management HP OpenView Configuration Configuration Management for Software CM and Physical CM.	Science Data Server Startup/Shutdown Insert Data into Science Data Server (selected data types) Temporal Metadata Search Acquire Data from Science Data Server (push and pull)	External Ingest Interfaces to SDPF, TSDIS, GDAO, and NESDIS Partial Request Management Ability to Insert Pre-Staged Data into Science Data Server	User Registration; Advertising (X-Interface) Directory and Inventory Search via V0 Gateway Browse	Setup and Submit DPR Job Management including add, monitor, cancel and add job dependencies

Release A Functionality Phase Two



CSS	MSS	DSS	INS	CIDM	PDPS
Create/Delete Server Objects Asynchronous Message Passing with Store, Forward, Recovery, and Persistence Support to MSS to Manage Server Applications Suspend/ Resume Time Service with Delta Time Multicast Message Service (FOS Requirement) Non-Secure html Server/Client	Extensible Agent and MIB for Applications Accountability H/W and S/W Performance Management H/W Fault Management Security Management (DCE) Ground Event Scheduling SMC Performance and Fault Management Change Request Management	Spacial Indexing and Stored Procedures for Spacial Updates Subscriptions Science Data Server Checkpoint/ Restart Document Data Server Advertisement Support 8mm Physical Media Distribution	Network and Physical Media Data Ingest Metadata Extraction from Ancillary Data	Release A Client Advertising (html Interface) Product Order and User Return Functions via V0 Gateway Valids Mapping Hypertext Viewer	Develop and Submit Candidate Plan Subscription Management PGE Execution and Management Resource Management

Release A Functionality Phase Three

CSS	MSS	DSS	INS	CIDM	PDPS
E-Mail & Bulletin Board Service Virtual Terminal and X Client/ Server Capabilities Secure html Server/Client Warm Standby on CSS Server Replication of DCE Servers	Software Fault Management Security [SMC] Management (Accountability) MDA Fault and Performance Data Extraction SMC Capabilities for Ground Event Scheduling, Security Management Trouble Ticketing CM, Baseline Mgr	Performance Enhancements All Media Distribution Formats Resource Queuing Staging Disk Management	Metadata Validation using Data Dictionary Preprocessing Early EDOS and LANDSAT 7 Interface (Message Passing)	Complete Workbench Capabilities including EOSView Secure html Interfaces Release A Client Ported to All Supported Platforms	Multiple Candidate Plans Synchronization of New Plan Publish Plans QA and AIT Interfaces

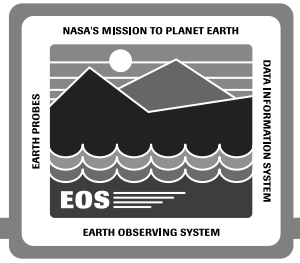
SLOC Estimates by Phase

Subsystem	Phase 1	Phase 2	Phase 3	Total
Data Server (DSS)	10,000	25,000	21,075	56,075
Ingest (INS)	4,400	8,750	5,900	19,050
Planning (PLS)	6,000	8,000	4,000	18,000
Data Processing (DPS)	6,900	11,500	8,360	26,760
Client (CLS)	2,700	4,000	1,500	8,200
Interoperability (IOS)	6,000	3,500	1,200	10,700
Data Management (DMS)	4,000	5,000	3,000	12,000
Management (MSS)	9,000	9,300	5,200	23,500
Communication (CSS)	24,000	15,000	9,000	48,000
Total	73,000	90,050	59,235	222,285

Schedule Feasibility by Phase For Code and Unit Test

	PHASE 1	PHASE 2	PHASE 3
SLOC/PHASE	73,000	90,050	59,235
SUBSYSTEM (Max Mos)	3.3	3.0	3.0
CIDM	2.7	2.5	1.5
CSS	3.1	2.6	2.1
Data Server	2.2	3.2*	3.0
Ingest	1.9	2.1	1.8
MSS	2.1	2.2	1.7
Planning	1.8	2.0	1.6
Data Processing	1.9	2.4	1.7
	* Exceeds Max Mos		

GUI Development Schedule



Interface regularly with DAAC and User Services operators August - October 1995 for preliminary GUI development

Deliver Preliminary 605 with detailed screen layouts and formats by October 1995 for operator review

Receive review comments within 4 weeks at least for Phase I

Deliver updated 605 by November 1995

Update GUIs for each phase during Release A implementation

Deliver “Final” 605 by October 1996

Scope and Outline

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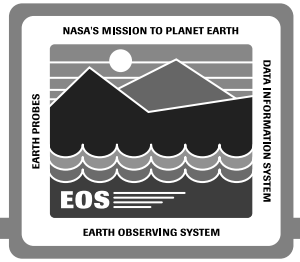
Schedule Needs for COTS Integration



COTS Integration Steps	Schedule Needs	Risk
Evaluation	↓	↓
Installation		
Test APIs		
Build Prototype		
Integration into system		

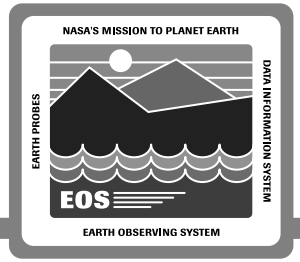
Schedule Needs for COTS Integration (cont.)

COTS Integration Steps	Schedule Needs	Risk
Product Maturity		
Extending “envelope”		

ECS COTS selections avoided these factors except for

- **Sybase/SQS**

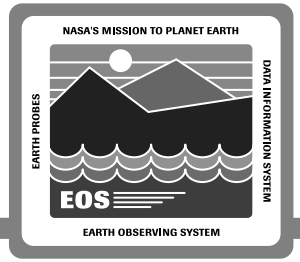
Reducing COTS Integration Risk



Potential for major incompatibility or problems with COTS is minimized

- **Major COTS packages have been in-house for over a year**
  - **e.g., DCE, HPOV, Sybase**
  - **Some of these have been used in EPs**
- **Prototyping activities have provided insight, validated design**
  - **V0 client/gateway/Data Server prototype**
- **Training of technical staff has been underway**

COTS Risk Mitigation

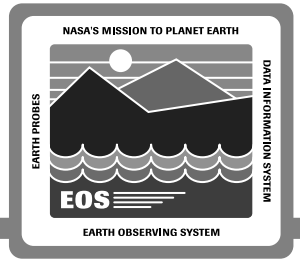


Key COTS	Prototype/Trade-off Study Analysis/Other
HP OpenView Network Node Manager	Map creation hierarchy and configuration of HP OpenView Network node manager to reflect the views representative of a DAAC.
Enterprise MIB	MIB objects defined corresponding to a small portion of the ECS Enterprise objects
SNMP Extensible Agent (Peer Logic)	Implementation of Enterprise MIB. SNMP, non-SNMP trade-off study analysis.
Software Configuration Management (ClearCase)	Product in house for more than a year. In use for SDP Toolkit development. ECS developers trained in the use of product.

COTS Risk Mitigation (cont.)

Key COTS	Prototype/Trade-off Study Analysis/Other
FSMS and DBMS (Sybase) products	Core Data Server prototype to explore encapsulation strategies and implementation approach for functional design.
Job Scheduler COTS (AutoSys)	Hands-on evaluation of COTS against planning and scheduling requirements, and interface engineering. Scheduling Engine trade study evaluates many COTS scheduling products.
DBMS (Sybase)	Data Server and Data Management prototypes studied data access patterns, database overhead, throughput, performance comparisons, etc. Prototype demonstrations given at EPs and PW1. DBMS Evaluations can be found in 440-TP-002-001, 440-TP-003-001. Sybase training for developers commenced July 1995.

Transition of Incremental Track Components to Release A



Why

Part of Release A functionality delivered by components developed on incremental track

Required components of Ir1, EPs, and Toolkits will be included

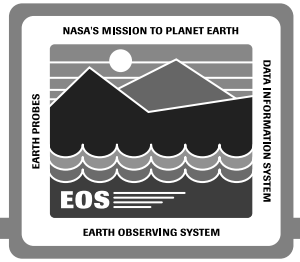
Plan

Any incremental track software which transitions to the formal track will be documented and standardized to conform to formal track software

When

Prior to acceptance testing and deployment of Release A

Ir1 Transition to Release A



Identify Ir1 software needed for Release A phase I implementation (Done)

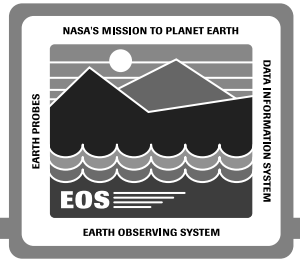
Incorporate identified Ir1 software components into Release A development environment at Ir1 code turnovers to I&T (Aug-Oct 1995)

Start Release A implementation with Ir1 software (Aug 1995)

Resynchronize with Ir1 baseline at Ir1 CSR using Clearcase CM (December 1995)

Start transition of Ir1 staff assigned to Release A (Nov 1995)

Version 0 Client Migration Process



What

Release A will include

- **V0 Client**
- **ECS specific enhancements**

Process

Freeze Interfaces (Sep. 1995)

Control Interfaces via ECS- to- V0 ICD

Freeze Design (Oct. 1995)

Use V0 Client software snapshot as needed for Phase I I&T (Jan- Feb 1996)

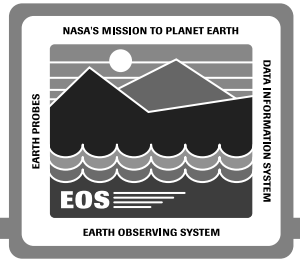
Baseline V0 Client as Release A Client (Mar 1995)

Include Release A Client software to Release A development and Integration Test Environments

Staff

Close coordination with V0 team co-located at Landover with ECS staff

Implications of V0 Data Migration for Release A



Assumption

- **Approval to start V0 data migration process by 1 Sept 95**

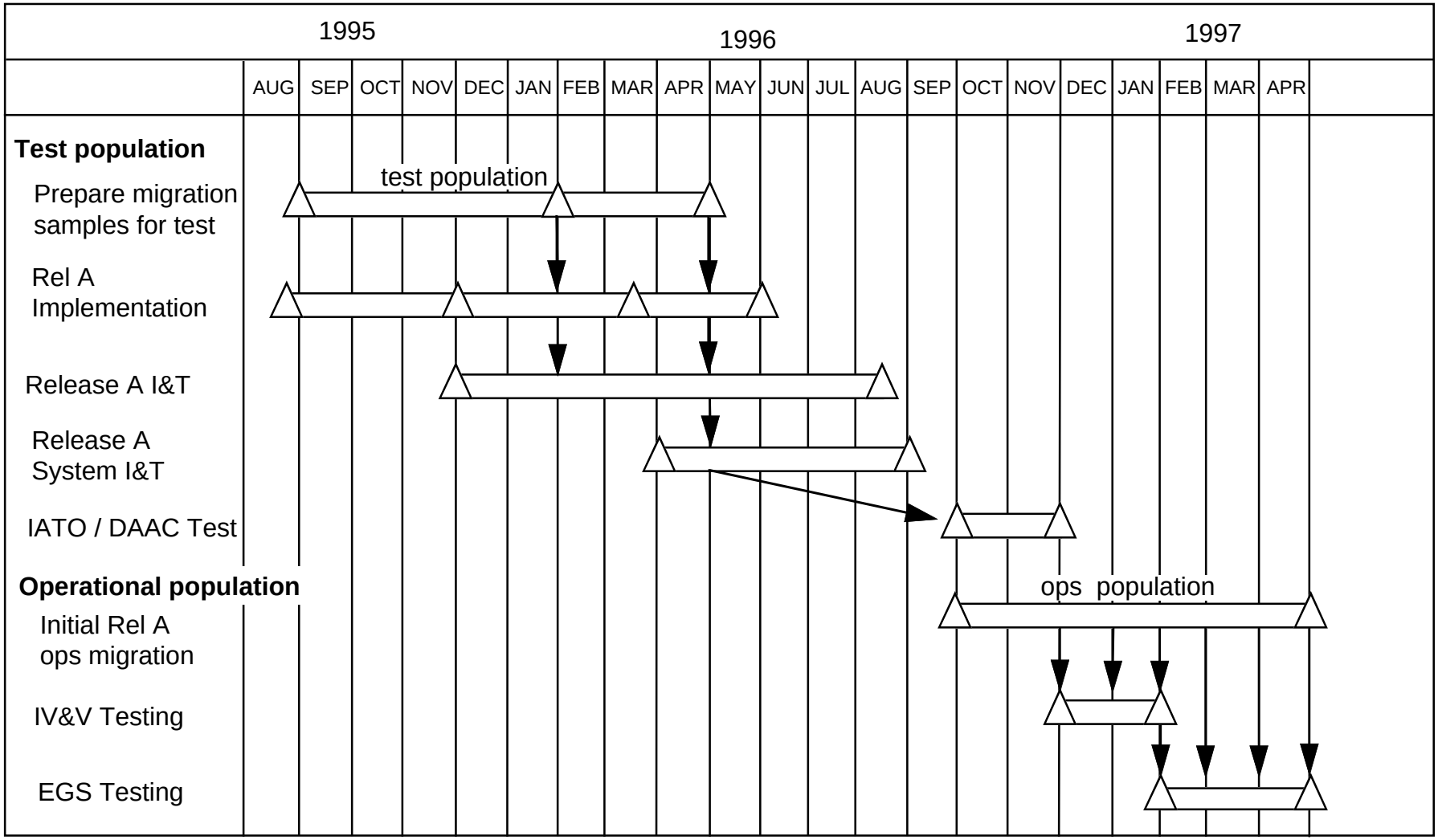
Test population sensitivities

- **Migrate portion of initial Release A V0 data to test ECS components**
  - **Initial 2 % (~60 Gbytes by 1 Feb 96)**
  - **Expand to 10% (~300 GBytes by 1 May 96)**
- **Flexibility to adjust test volume based on approval date**

Operational population sensitivities

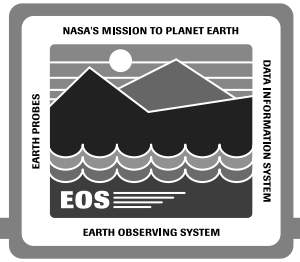
- **Operational population with initial migrated V0 data (2.9 TBytes) after Release A CSR**
  - **Bug fixes could result in rework**
  - **Configuration control needed for populating Data Server**
- **Sufficient lead time to prepare for operational population**

Proposed V0 Data Migration Schedule*



*Assumes approval to start V0 data migration by 1 Sep 95

Schedule for EP Transition to Release A



What

CSS: Directory Naming; Security (Authentication); OODCE Development Environment; Distributed Object Framework (non-robust)

CIDM: Advertising (Manual Posting); User Registration (pre-MSS interface)

EOSView (stand-alone tool)

How

Baseline first two components at EP6 delivery (Sep. 1995)

Include in the Release A development and I&T environments (Sep. 1995)

Baseline EOSView (June 1996)

Include in the Release A development and I&T environments (July 1996)

Technical Staff

CSS, CIDM, EOSView related work on EP6 performed by Release A staff

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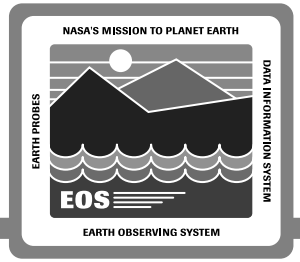
- **Summary**

Release A Integration and System Test



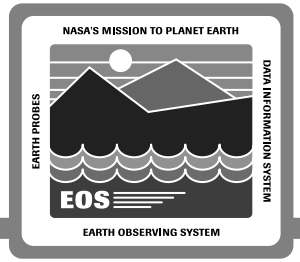
Process and Technical details covered by previous presentation

Starts in October 1995

Trails code and unit test by two months

Strategy provides more time for integration and system test

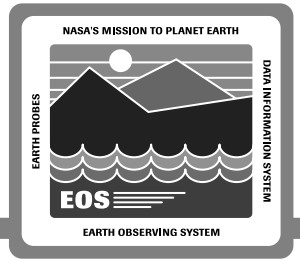
Impementation Schedule for Critical Path Components



Available in hardcopy only.

Note: Based on REVIC Duration Predictions

Release A Acceptance Testing



Acceptance Testing is the final development contractor test activity

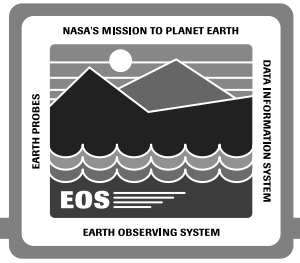
Verifies functionality and performance of ECS Release A at the sites against the Level 3 requirements.

- **Led by the Independent Acceptance Test Organization (IATO) in ECS**
- **Performed at the Release A DAACs (GSFC, MSFC, LaRC, EDC), the SMC and the EOC**
- **Details of the Acceptance Test Process are documented in the Acceptance Test Management Plan (DID 415) submitted at SDR (available on EDHS)**

Schedule

- **Starts July 1996**
- **Site testing starts October 1996 with CSR**
- **Finishes December 1996 with RRR**

Release A SSI&T Support



Release A SSI&T support consists of

- **Integrating Ir1 SSI&T tools and scripts**
- **Procuring additional tools**
- **Developing scripts to support SSI&T process**

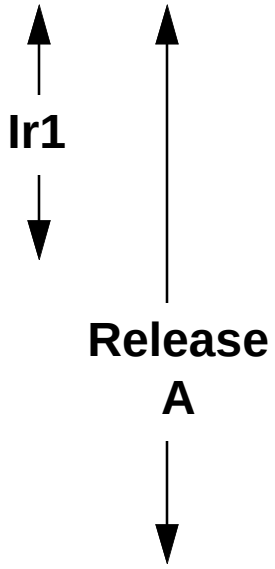
Goals of SSI&T

Principal Goal:

- **Test the Production Readiness of the Science Software**
  - **Reliability** **(i.e., runs to normal completion repeatedly over the normal range of data inputs and run-time conditions)**
  - **Safety** **(i.e., executes without interfering with other S/W or DAAC operations)**

Other Goals:

- **Refine Science Software I&T Process**
  - **Procedures, Reviews, Organizational Responsibilities**
  - **Tools (e.g., code checkers, scripts, etc.)**
- **Demonstrate Portability of the Science Software**
  - **Adherence to standards**
  - **Use of SDP Toolkit**
- **Determine Production Resource Requirements**
  - **(e.g., CPU time, I/O, RAM, temporary storage)**
- **Test Interfaces**
  - **SCF <--> DAAC Interfaces** **(e.g., Log Files, QA Data)**
  - **Ancillary Data Inputs** **(e.g., NMC Data)**



SDP Software Deliveries for TRMM Release

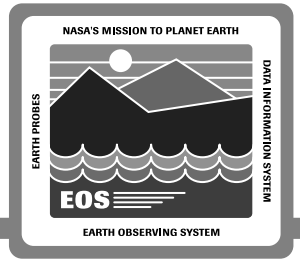
Instrument	SSI&T DAAC Site
CERES	LaRC
LIS	MSFC
ASTER	EDC
MISR	LaRC
MODIS	GSFC, EDC
MOPITT	LaRC

Scope and Outline

Release A CDR to TRMM Launch

- **Release A and Overall ECS schedule**
- **Ir1 Status**
- **Planning Considerations**
- **Custom Code Development**
- **Integration of COTS and Incremental Track Software**
- **Test Activities**
- **TRMM Operations Readiness** 
- **Summary**

Release A DAAC Procurement and Installation Schedule



COTS Procurement has been an integral part of the Detailed Design effort

- **The Procurement Team identifies candidate products that could meet ECS requirements**
- **Prototypes and product evaluations used to select product**
- **Physical design is developed, reviewed and refined with Science and DAAC personnel (e.g., at CDR)**

Final designs are approved by the ECS CCB

Approved designs are turned into Purchase Orders for NASA approval

COTS is staged though the EDF and delivered and installed on a staggered schedule to each site

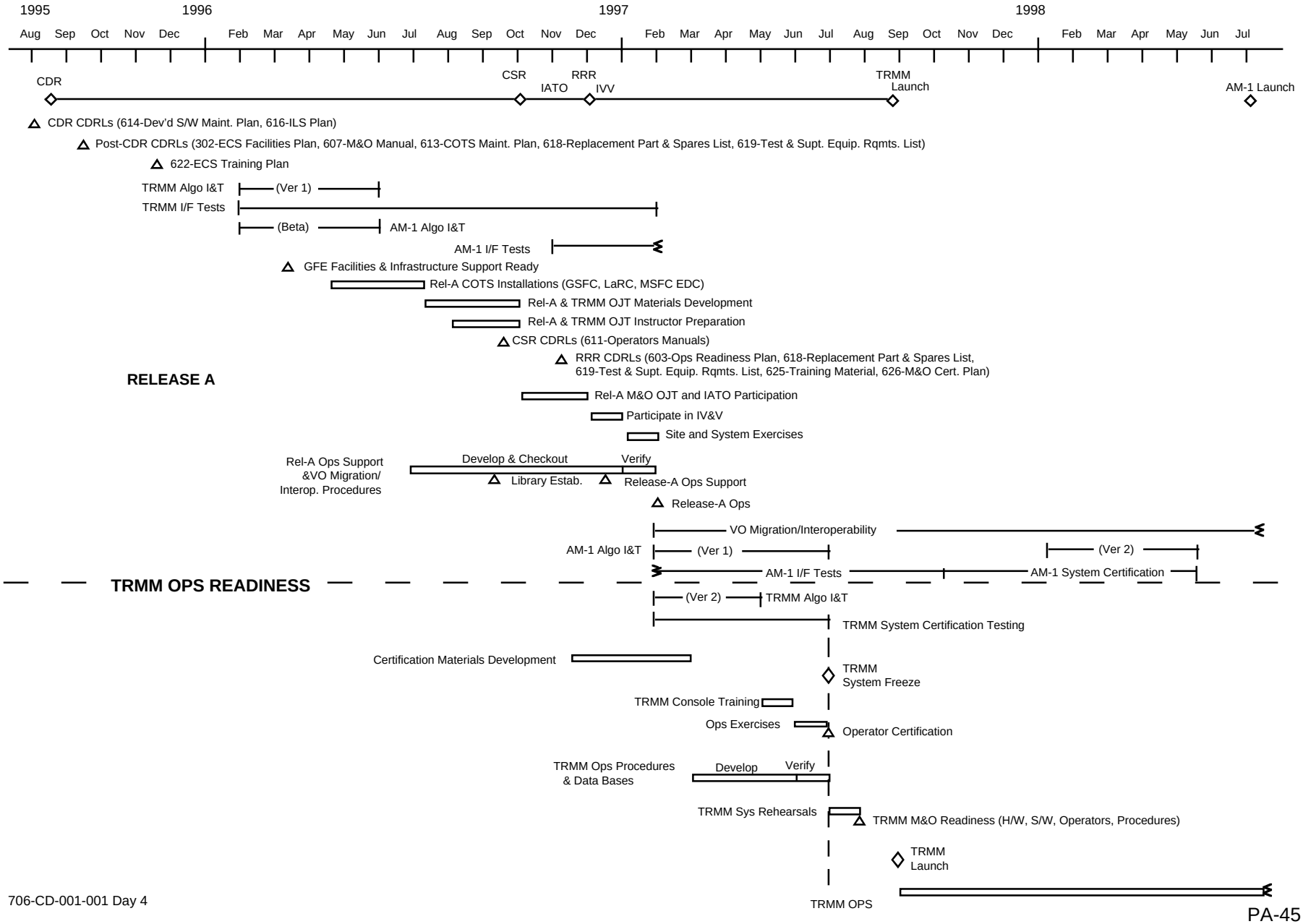
Installation, "burn-in," and acceptance of COTS occurs at each site

Release A DAAC Procurement and Installation Schedule

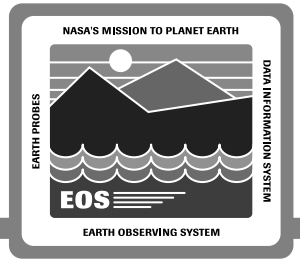
Release	Event	Scheduled Dates	Actual Dates/Comments
Rel A:	Identify Prototypes/Products for Evaluation	Jun - Sep 1995	Started 5/12; "in progress"
DAACs	Identify Products NOT Under Contract	Jun - Sep 1995	"In Progress"
	Develop Procurement Schedule	Jun - Sep 1995	"In Progress"
	Receive Release Design	Jul 24, 1995	Complete
	Prepare Physical Design	Aug 11, 1995	Complete
	Present to Release Team	Aug 18, 1995	"In Progress"
	Obtain Feedback (incldg. Science/DAAC personnel)	Aug - Oct 1995	CDR Feedback
	Configure COTS BOM	Aug- Dec 1995	"In Progress"
	Design is FINAL (no more refinements)	Oct 1995	
	Prepare Justification	Dec 1995	
	Present Recommendation to Release CCB	Dec 1995	
	Present Reccommendation to ECS CCB	Dec 1995	
	Prepare POs	Jan 1996	
	Submit to NASA for "consent"	Jan 1996	
	Release POs	Feb - Mar 1996	
	Equipment Delivered	Mar - May 1996	
	Equipment Installed	Apr - Sep 1996	
	EDC	Jun - Sep 1996	
	GSFC, SMC, EOC	Apr - Jul 1996	
	LaRC	May - Aug 1996	
	MSFC	Jun - Sep 1996	

* as of 8/10/95

Release A & TRMM Ops Readiness



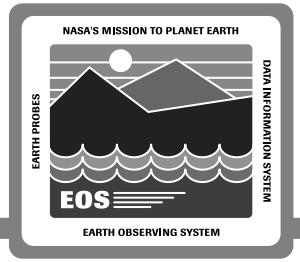
Release A & TRMM Ops Readiness



M&O has developed a two-phased plan of readiness for operations of the Release A system to support:

- **Phase 1**
  - **V0 Migration/Interoperability**
  - **AM-1 SSI&T and I/F Tests**
  - **TRMM SSI&T and I/F Tests**
- **Phase 2**
  - **TRMM Science Data "Ops"**

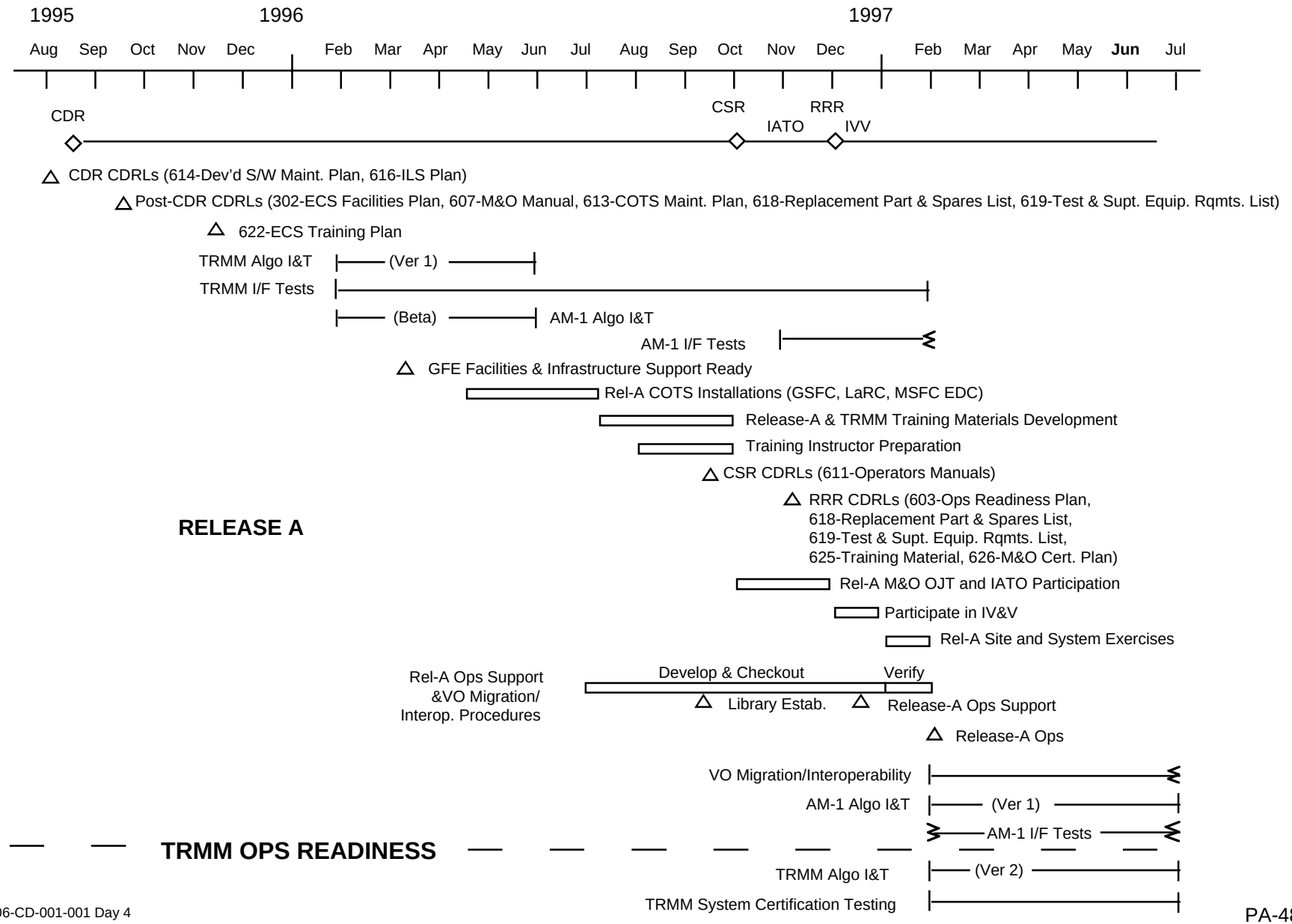
Integrated with Development and Testing



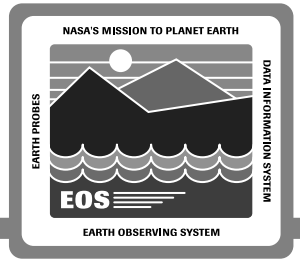
The ops readiness activities are planned and scheduled consistent with:

- **Release A development schedules for deployment, testing and documentation delivery as well as optimizing developer support to ops training readiness and execution**
- **ESDIS IV&V and I/F testing schedules (late June 95)**
- **Instrument team SSI&T plans**

Release A Ops Readiness



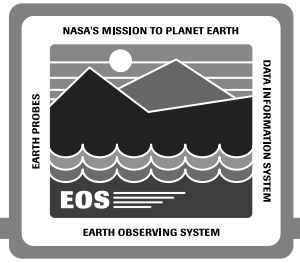
Ops Readiness Activities



Readiness schedules include the following type of activities and approximate start dates and duration:

- **Algorithm integration and testing using Ir1 and Release A**
- **Interface testing using Ir1 and Release A**
- **Release A H/W installation**
- **Document preparations**
- **IV&V testing**
- **Training and certification**
- **Pre-launch operations**

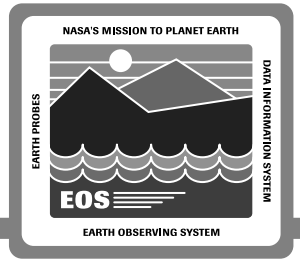
Release A Operations Readiness



- **Ir1 to Release A Transition**
  - **Release A H/W added to Ir1 H/W as re-use**
  - **Must maintain operable Ir1 for SSI&T and I/T tests to the extent feasible**
  - **CSR through IV&V activities may be resource constrained and pre-empt Ir1 activities**
  - **Further detailed planning required**

- **Post-CDR M&O documents and development documents (operator manuals, as-builts) support operator training and ops procedures development**

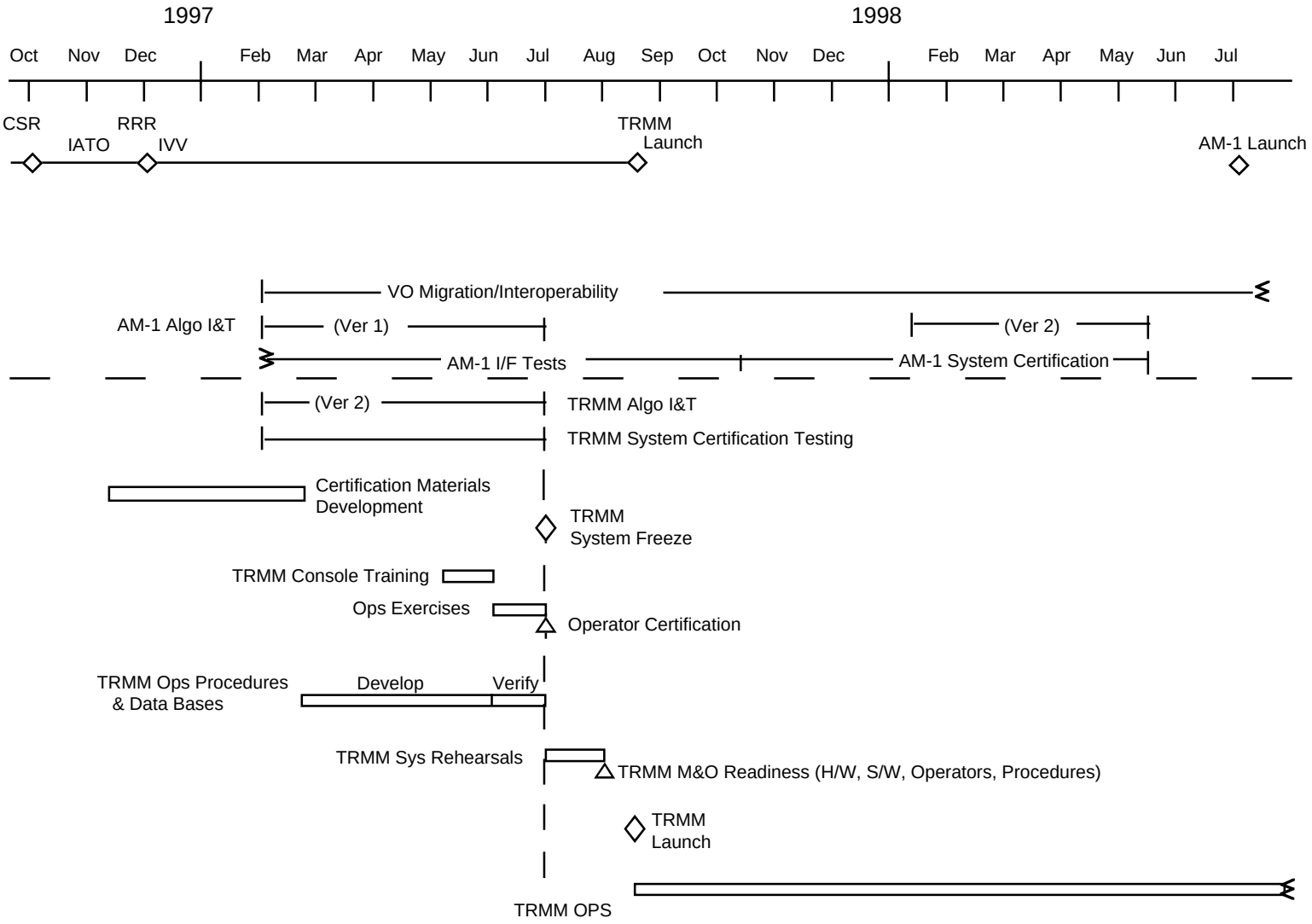
Release A Operations Readiness (cont.)



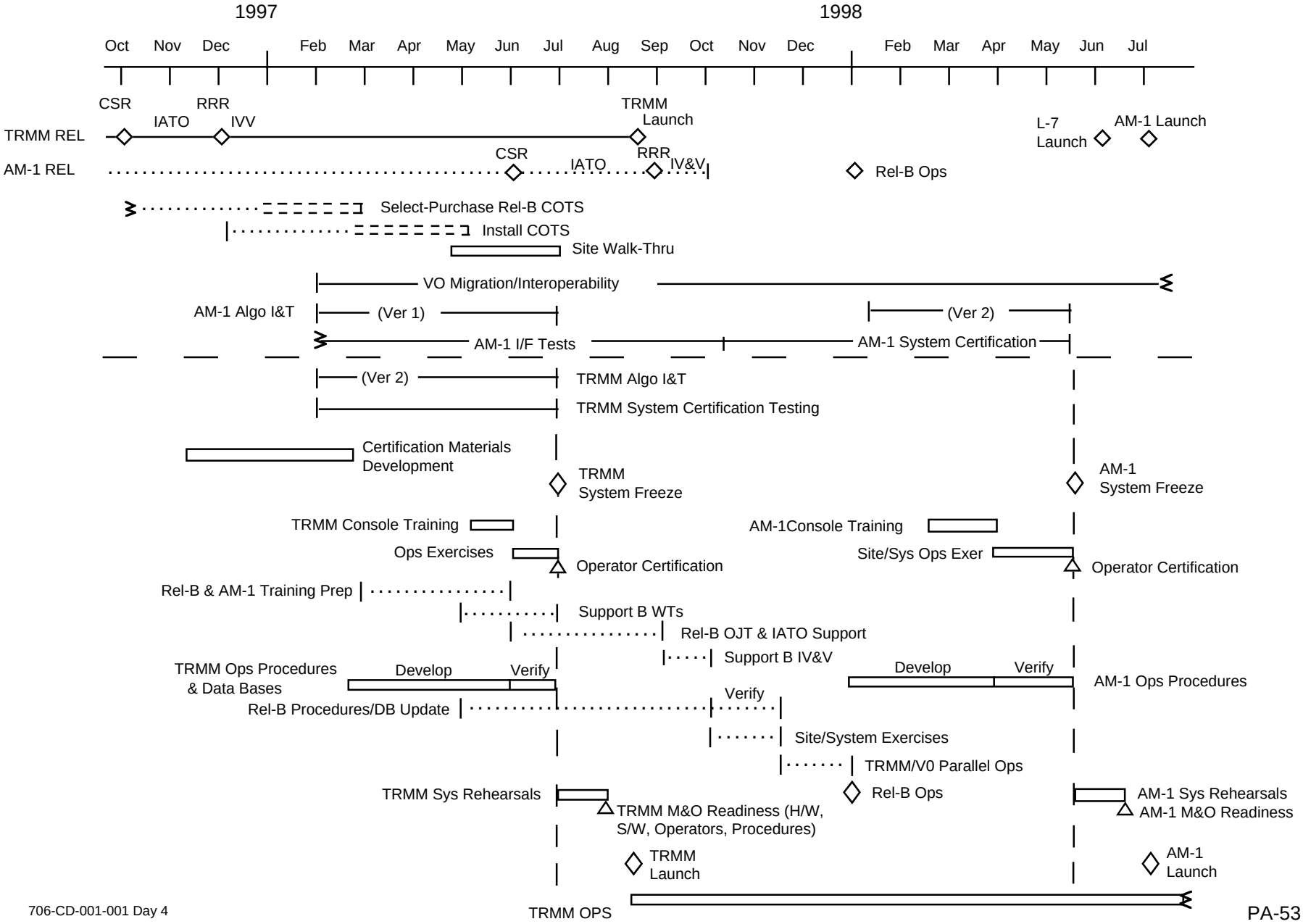
- **Ops training concept (ECS, ESDIS, DAACs) includes:**
  - **ECS doc review**
  - **COTS training (vendor, in-house experts)**
  - **Classroom (developer support)**
  - **Console (developer support)**
  - **Participation in SSI&T IATO, IV&V**
  - **Site and system exercises (test environments)**

- **Ops procedures, V0 prep**
  - **Develop procedures from ops concepts, development docs, test procedures**
  - **Verify procedures during training, exercises**
  - **Support V0 data migration (detailed plan in work)**

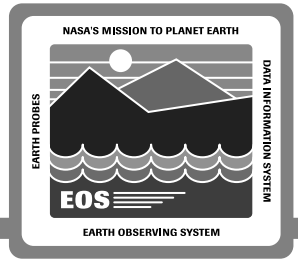
TRMM Ops Readiness



TRMM, Release B & AM-1 Ops Readiness

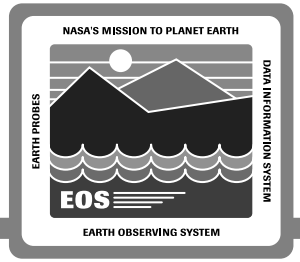


TRMM Operations Readiness



- **TRMM ops readiness activities**
  - **TRMM operator cert. materials developed from position descriptions**
  - **Current and new M&O staff receive concentrated TRMM training (Console-Individual, Exercises-Teams)**
  - **Procedures and databases developed by M&O and verified during ops exercises**
  - **Proposed system configuration freeze ~ L-45**
  - **Operators, procedures, databases, H/W & S/W finally verified during ops rehearsals**

Preview of Concurrent Test and Operations



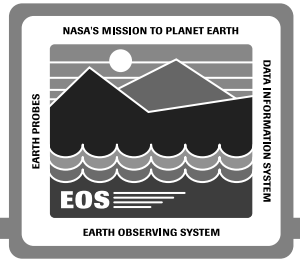
Release A architecture supports concurrent test and operations

Some key resources such as networks and Robotics need to be shared

Use infrastructure and COTS features to partition environments

More detailed discussion on this topic is an IDR-B item

Preview of Concurrent Test and Operations (cont.)



COTS

Use COTS features to provide multiple logical instances on the same hardware resources (e.g. multiple Sybase instances)

Infrastructure Features for Logical Partitioning of Test and Operations

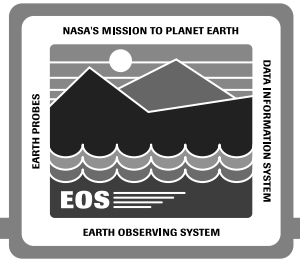
DCE supports simultaneous execution of multiple versions in a single cell

Use the time service features to provide delta time to test users
(e.g. Constructor of time service class allows offset to be specified)

Name server and security server can support test users and test software processes

Test Clients will belong to an advertising group that limits their access to only test data and products

Concept of Release A to B Transition



Architecture supports concurrent test and operations

Hardware resources for testing may not be dedicated for every component

Release B DAAC equipment installation scheduled for Dec 96 through Mar 97 in parallel with Release A Operations

Potential contention with pre-launch testing as well as operational readiness activities

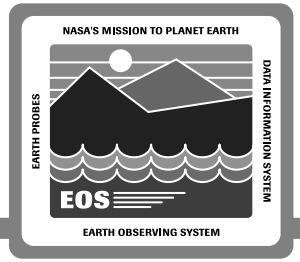
Working group being formed to develop a detailed plan with reps. from SCDO, Release A, Release B, M&O, and SMO

Scope and Outline

Release A CDR to TRMM Launch

- **Release A and Overall ECS schedule**
- **Ir1 Status**
- **Planning Considerations**
- **Custom Code Development**
- **Integration of COTS and Incremental Track Software**
- **Test Activities**
- **TRMM Operations Readiness**
- **Summary** 

Summary of Road to TRMM



Custom Code development schedule is feasible, little slack for CSS and DSS

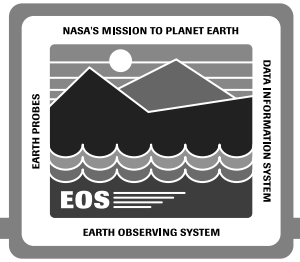
Concurrent integration test and code/unit test provide more time for testing

COTS integration risk is minimized through prior and ongoing evaluation and prototyping activities

Processes and schedules in place for integrating incremental track software

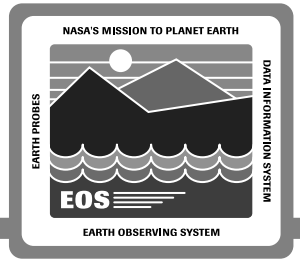
Operational readiness activities underway and on schedule

CDR Review Criteria Vs. CDR



- **Does the ECS Design Reflect a clear understanding of the Release A requirements?**
  - **CDR CDRLs, CDR briefing, various workshops & prototypes**
- **Is the design sufficient to initiate coding?**
  - **Satisfies Release A requirements, CDR CDRLs and RTM have requirements trace to design, CDR briefings**
  - **Reflects ops concept, CDR subsystem briefings and HMI presentation covered this**
- **Components appropriately allocated to incremental /formal track**
  - **analysis and lessons learned from prototypes and trade studies included in the design, Results demonstrated in the Thursday session on demos, notable V0 client to Gateway to Data server prototype**
  - **COTS selected, CDR briefings and CDRLs show how they fit in the design**

CDR Review Criteria Vs. CDR (cont.)



- **Does hardware physical topology meet requirements for Release A?**
  - **ECS architecture presentation (Monday), Facility Designs (Thursday), Poster session and documentation handed out at CDR and CDR CDRLs**
- **Error and exception handling design**
  - **DID 305 volume 4 shows the concept, and individual subsystem design documentation and CDR briefings cover this aspect**
- **Is the Implementation Plan adequate?**
  - **Software size estimates covered in Road to TRMM launch briefing today**
  - **Presented schedules, identified critical path items, showed how we plan to meet schedules**
  - **Risks identified and mitigation plan documented in CDR CDRL and in briefing today on Risk management**